

WHAT IS CLAIMED IS:

\1. An injection molding machine with a vertically displaceable closing unit, comprising:

a plate-like lower yoke as a counterpressure plate;

a plate-like upper yoke as a stationary mold clamping plate;

at least three vertically aligned struts connecting the lower yoke and the upper yoke with each other in their marginal zones in a force-locked manner;

another plate-like element serving as a displaceable mold clamping plate, said another plate-like element being displaceable on the struts;

one or more driving cylinders for displacing said displaceable mold clamping plate, said cylinders having a small cross section and large stroke length, and being stopped on said displaceable mold clamping plate and on the counterpressure plate, in a manner such that single- or multi-component molding tool halves arranged on surfaces of the mold clamping plates facing each other are driven from a maximum spacing into a position of mutual abutment, and vice-versa; and

a short-stroke cylinder with a larger cross section acting between the counterpressure plate and the displaceable mold clamping plate engaged for generating required closing pressure;

wherein the engageable short-stroke cylinder is a piston-and-cylinder system acted upon by a fluid medium, said piston-cylinder system, in an abutting position, being retractable and extendable in a horizontal direction from an external space of the closing unit (3) between the counterpressure plate (4) and the displaceable mold clamping plate (5).

2. The injection molding machine according to claim 1, wherein in addition to a stroke volume that is briefly filled with or drained from the fluid medium, the piston-cylinder system (2) comprises a pre-tensioning volume into which different amounts of the fluid medium are admitted at randomly greater time intervals for generating the short stroke so as to be able to adapt a starting height of the piston-cylinder system (2) to different heights of the molding tool for a short-stroke operation.

3. The injection molding machine according to claim 2, wherein a lifting volume and the pre-tensioning volume form one common chamber.

4. The injection molding machine according to claim 3, wherein the lifting volume is defined by controlling the amount of fluid medium flowing in and out for generating the short stroke.

5. The injection molding machine according to claim 1, wherein a hydraulic fluid is used as the fluid medium.

6. The injection molding machine according to claim 1, wherein the piston-cylinder system (2) is retracted into and extended from the closing unit (3) by one or more piston-cylinder units (50) having a horizontal longitudinal axis.

7. The injection molding machine according to claim 1, wherein the piston-cylinder system (2) is retracted into and extended from the closing unit (3) by means of one or more electric motor-driven spindle drives having a horizontal longitudinal axis.

8. The injection molding machine according to claim 1, wherein the piston-cylinder (2) is retraced into and extended from the closing unit (3) by means of one or more electric motor-driven gear-and-rack drives having a horizontal longitudinal axis.

9. The injection molding machine according to claim 1, wherein a lower bottom surface (25) of the piston-cylinder system (2) facing the counterpressure plate (4) is directly displaced on the counterpressure plate (4) and a support plate (12) extending an upper cover surface (11) of said counterpressure plate.

10. The injection molding machine according to claim 9, wherein a surface of the counterpressure plate (4) and the support plate (12) coming into contact with the lower bottom surface (25) of the piston-cylinder system (2) has the form of a flat bed (14).

11. The injection molding machine according to claim 9, wherein at least a surface of the counterpressure plate (4) and support plate (12) coming into contact with the lower bottom surface (25) of the piston-cylinder system (2), and the lower bottom surface (25) of the piston-cylinder system, are subjected to a surface treatment for reducing the coefficient of friction.

12. The injection molding machine according to claim 9, wherein a lubricant is admitted into an area between the counterpressure plate (4) and support plate (12), and the lower bottom surface (25) of the piston-cylinder system (2).

13. The injection molding machine according to claim 1, wherein a lower bottom surface (25) of the piston-cylinder system (2) facing the counterpressure plate (4) is displaced on the counterpressure plate (4) and support plate (12) by means of wheel- or roller-type elements (22, 23) mounted on the piston-cylinder system or in or on the counterpressure plate (4) and support plate (12), wherein the

wheel- or roller-type elements (22, 23) each are supported so that the piston-cylinder system (2) is positioned on the counterpressure plate (4) in its working position between the counterpressure plate (4) and the displaceable mold clamping plate (5).

14. The injection molding machine according to claim 13, wherein the wheel- or roller-type elements (23) are supported by hydraulic or pneumatic piston-cylinder units (33) with vertical longitudinal axes in or on the lower bottom surface (25) of the piston-cylinder system (2) or in or on the counterpressure plate (4) and the support plate (12).

15. The injection molding machine according to claim 13, wherein the wheel- or roller-type elements (23) are supported by spring systems (32) with a vertical line of action, in or on the lower bottom surface (25) of the piston-cylinder system (2) or in or on the counterpressure plate (4) and the support plate (12), with a spring force of such spring systems being adequate for extending the wheel- or roller-type elements (23) when solely loaded by the weight of the piston-cylinder system (2), but permitting the piston-cylinder system (2) to be placed on the counterpressure plate (4) when the engageable short-stroke cylinder is actuated.

16. The injection molding machine according to claim 9, wherein the counterpressure plate (4) and support plate (12) or the lower bottom surface (25) of the piston-cylinder system (2) comprise additional guide elements selected from the group consisting of rails (35), grooves (34, 36) and roller tracks (22, 23) cooperating with adapted counter elements selected from the group consisting of wheel- or roller-type elements (22, 23), grooves (34, 36), guide pins and roll-off surfaces (24).

17. The injection molding machine according to claim 9, wherein the piston-cylinder system (2) is connected in a bottom zone in a force-locked manner with a piston rod (51) of a horizontally actuated hydraulic or pneumatic piston-cylinder device (50) via a rigid strutting (54), said piston rod being guided outside of the cylinder by means of a smooth tube (52, 53) being slotted over its length for the passage of the rigid strutting (54), said tube being horizontally arranged in or underneath the support plate (12) and in the counterpressure plate (4).

18. The injection molding machine according to claim 9, wherein the lower bottom surface (25) of the piston-cylinder system (2) comprises pocket-like recesses (55) each accommodating a nozzle (56), to which a highly pressurized gaseous pressure medium is admitted.

19. The injection molding machine according to claim 18, wherein highly compressed air is used as the gaseous medium.

20. The injection molding machine according claim 9, wherein the piston-cylinder system (2) is mounted on a transport plate (20) and connected with said transport plate with a force-locked connection, wherein an underside of the transport plate (20) forms the lower bottom surface (25) of the piston-cylinder system (2).

21. The injection molding machine according to claim 20, wherein the force-locked connection between the piston-cylinder system (2) and the transport plate (20) is detachable.